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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/380,864

Applicant(s)

TWIGG, MARTYN VINCENT

Examiner

Jennifer A. Leung

Art Unit

1764

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 9-11, 14, 15, 21-23, 26, 27, 29, 30 and 34-37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 9-11, 14, 15, 21-23, 26, 27, 29, 30 and 34-37 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 30, 2006 has been entered.

Response to Amendment

2. Applicant's amendment submitted on June 30, 2006 has been received and carefully considered. Claims 1-8, 12, 13, 16-20, 24, 25, 28 and 31-33 are cancelled. Claims 9-11, 14, 15, 21-23, 26, 27, 29, 30 and 34-37 are active.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 9-11, 14, 15, 21-23, 26, 27, 29, 30 and 34-36 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Regarding claims 9, 21 and 36, it is unclear as to where Applicant has support for the

Art Unit: 1764

newly added limitation of, “an oxidation catalyst platinum group metal (PGM)... present in the oxidation catalyst system at a loading of $> 30 \text{ g/ft}^3$ ”. The Examiner is only aware of the disclosure of a single data point of Pt having a loading of “ 100 g/ft^3 ” (see oxidation catalyst (5); Table 3 on page 7). There does not appear to be any support for PGM loadings between 30 and 100 g/ft^3 , or PGM loadings greater than 100 g/ft^3 .

Regarding claims 9, 21, 34 and 36, it is unclear as to where Applicant has support for the newly added limitation of, “a support selected from the group consisting of alumina, a zeolite, ceria, and zirconia.” It is noted on page 2, lines 19-23, of the specification that,

“The first catalyst system may be, for example, a relatively low loading of catalytically active component on a substrate, optionally in combination with components that can retain NO_x and/or reducing species, such as zeolite or like absorbents, or alkaline earth metal compounds.”

According to this disclosure, the zeolite has not been described as a support. Only the substrate has been described as a support. It is further noted that page 3, lines 13-21, states that,

“Generally, a support which is a honeycomb-type extruded ceramic or wound metal monolith or “brick” is coated with a surface area-enlarging washcoat, for example a washcoat consisting of or comprising alumina. Deposited onto the washcoat is a coating of one or more catalytic components, optionally with one or more other components such as ceria, zirconia, zeolite or the like...”

According to this disclosure, the only elements that could be considered “supports” are the honeycomb-type extruded ceramic or wound metal monolith or brick, which serves as a support for the alumina washcoat, and the alumina washcoat itself, which serves as a support for the catalytic components and the other components of ceria, zirconia, zeolite or the like.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 9-11, 14, 15, 21-23, 26, 27, 29, 30 and 34-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rembold et al. (US 5,665,318) in view of Ishibashi et al. (US 5,330,732) in view of Keith et al. (US 3,331,787).

Regarding claims 9 and 34-36, Rembold et al. (FIG. 1; column 3, lines 20-34) discloses a lean burn diesel engine (an engine, with cylinder 1, consuming diesel fuel from tank 15; evidenced by column 4, lines 8-13) in combination with an emission control system, the emission control system consisting of:

a lean NOx catalyst system (reduction catalyst 11; column 4, lines 15-68);

an oxidation catalyst system (oxidation catalyst 12; column 3, lines 29-34); and

means (metering valve 23 with device 26) for injecting hydrocarbon fuel (from fuel tank 15) into

the exhaust upstream of the lean NOx catalyst system 11;

the lean NOx catalyst system 11 being disposed upstream of the oxidation catalyst system 12.

Rembold et al., however, is silent as to the lean NOx catalyst system 11 and the oxidation catalyst system 12 each having the instantly claimed components.

Ishibashi et al. teaches a lean NOx catalyst system (column 1, lines 43-51) consisting of a platinum catalyst present at a loading of $< 30 \text{ g/ft}^3$ and a support selected from the group consisting of alumina, a zeolite, ceria and zirconia, or a surface area-enlarging washcoat (see Pt catalyst examples in Tables 1 and 4; see also FIGs. 1 and 4; see also column 2, lines 47-68, and column 3, lines 11-30). It would have been obvious or one of ordinary skill in the art at the time

Art Unit: 1764

the invention was made to substitute the lean NO_x catalyst system of Ishibashi et al. for the lean NO_x catalyst system 11 in the apparatus of Rembold et al., on the basis of suitability for the intended use, because the substitution of known equivalent structures (i.e., one known lean NO_x catalyst system for another known lean NO_x catalyst system) merely involves ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958).

In addition, Keith et al. teaches an oxidation catalyst system (see column 1, lines 11-21) consisting of a platinum group metal present at a loading of $> 30 \text{ g/ft}^3$ (see column 3, line 50 to column 4, line 2) and a support selected from the group consisting of alumina, a zeolite, ceria and zirconia (see column 5, line 48 to column 6, line 2). (see also Examples I, II, III). It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the oxidation catalyst system of Keith et al. for the oxidation catalyst system 12 in the apparatus of Rembold et al., on the basis of suitability for the intended use, because the oxidation catalyst system taught by Keith et al. is high in activity, has a long life, and is extremely durable under extreme operating conditions (see column 1, lines 22-40). Furthermore, the substitution of known equivalent structures (i.e., one known oxidation catalyst system for another known oxidation catalyst system) merely involves ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958).

Regarding claims 10 and 11, the collective teaching of Rembold, Ishibashi and Keith is silent as to whether the lean NO_x catalyst system has an activity sufficient to provide a ratio of % NO_x to % HC conversion of at least 0.2, or whether the oxidation catalyst system has an activity

Art Unit: 1764

sufficient to provide a % HC conversion greater than 80% and a % CO conversion greater than 70%, as measured under the testing conditions of 230 °C, a space velocity of 25,000 hr⁻¹, and an HC:NO_x input ratio of 3:1 counting the HC as equivalent propane. In any event, the modified apparatus of Rembold et al. meets the claims, since although the instantly claimed conversion rates for the given testing conditions are not specifically disclosed, a newly discovered property does not necessarily mean the product is unobvious, since this property may be inherent in the prior art. *In re Best* 105 USPQ 430 (CCPA 1977); *In re Swinehart* 169 USPQ 226 (CCPA 1971). Because the modified apparatus of Rembold et al. comprises each of the instantly claimed elements, one having ordinary skill in the art would not expect a different and/or an unexpected result to be obtained. Furthermore, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select an appropriate temperature, space velocity, and input ratio of HC:NO_x for the catalyst system evaluation on the basis of suitability for the intended use, since what is recited is merely a testing condition, and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

Regarding claim 14, Keith et al. teaches that the oxidation catalyst platinum group metal is platinum (see Examples 1 and 2).

Regarding claim 15, Keith et al. teaches that in general, the amount of platinum group metal added to the system will vary, but in all instances, the amount will be sufficient to provide a small but catalytically effective amount of the platinum group metal in the final catalyst for the purpose for which the catalyst was intended. For instance, in automobile exhaust oxidation and other similar oxidation processes, the oxidation catalyst system contains at least about 1.4 g/L,

Art Unit: 1764

often up to about 7 g/L, and preferably about 1.8 to 4.8 g/L of the platinum group metal. (see column 3, line 50 to column 4, line 2). Hence, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate loading of platinum group metal to be contained in the oxidation catalyst system in the modified apparatus of Rembold et al. (such as the recited amount of about 100 g/ft³), because it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233. Furthermore, numerical ranges that overlap prior art ranges were held to have been obvious. *In re Wertheim* 191 USPQ 90 (CCPA 1976); *In re Malagari* 182 USPQ 549 (CCPA 1974); *In re Fields* 134 USPQ 242 (CCPA 1962); *In re Nehrenberg* 126 USPQ 383 (CCPA 1960).

Regarding claims 21 and 37, Rembold et al. discloses a process for the control of emissions from a lean-burn internal combustion engine (i.e., a compression-ignition internal combustion engine utilizing diesel fuel 15; column 4, lines 17-27), said process consisting of: passing exhaust gas from the engine over a lean NOx catalyst system (reduction catalyst 11; column 4, lines 15-68); passing the product gases exiting from the lean NOx catalyst system over an oxidation catalyst system (oxidation catalyst 12; column 3, lines 29-34); and introducing additional hydrocarbon fuel (from tank 15) into the exhaust gas (via metering valve 23 with device 26) before the exhaust gas contacts the lean NOx catalyst system 11. Rembold et al., however, is silent as to the lean NOx catalyst system 11 and the oxidation catalyst system 12 each having the instantly claimed components.

Ishibashi et al. teaches a lean NOx catalyst system (column 1, lines 43-51) consisting of a

Art Unit: 1764

platinum catalyst present at a loading of less than 30 g/ft³ and a support selected from the group consisting of alumina, a zeolite, ceria and zirconia, or a surface area-enlarging washcoat (see Pt catalyst examples in Tables 1 and 4; see also FIGs. 1 and 4; see also column 2, lines 47-68, and column 3, lines 11-30). It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the lean NO_x catalyst system of Ishibashi et al. for the lean NO_x catalyst system in the process of Rembold et al., on the basis of suitability for the intended use, because the substitution of known equivalent structures (i.e., one known lean NO_x catalyst system for another known lean NO_x catalyst system) merely involves ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958).

In addition, Keith et al. teaches an oxidation catalyst system (see column 1, lines 11-21) consisting of a platinum group metal present at a loading of greater than 30 g/ft³ (see column 3, line 50 to column 4, line 2) and a support selected from the group consisting of alumina, a zeolite, ceria and zirconia (see column 5, line 48 to column 6, line 2). (see also Examples I, II, III). It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the oxidation catalyst system of Keith et al. for the oxidation catalyst system in the process of Rembold et al., on the basis of suitability for the intended use, because the oxidation catalyst system taught by Keith et al. is high in activity, has a long life, and is extremely durable under extreme operating conditions (see column 1, lines 22-40). Furthermore, the substitution of known equivalent structures (i.e., one known oxidation catalyst system for another known oxidation catalyst system) merely involves ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152

USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958).

Regarding claims 22 and 23, the collective teaching of Rembold, Ishibashi and Keith is silent as to whether the lean NO_x catalyst system has an activity sufficient to provide a ratio of % NO_x to % HC conversion of at least 0.2, or whether the oxidation catalyst system has an activity sufficient to provide a % HC conversion greater than 80% and a % CO conversion greater than 70%, as measured under the testing conditions of 230 °C, a space velocity of 25,000 hr⁻¹, and an HC:NO_x input ratio of 3:1 counting the HC as equivalent propane. In any event, the modified process of Rembold et al. meets the claims, since although the instantly claimed conversion rates for the given testing conditions are not specifically disclosed, a newly discovered property does not necessarily mean the product is unobvious, since this property may be inherent in the prior art. *In re Best* 105 USPQ 430 (CCPA 1977); *In re Swinehart* 169 USPQ 226 (CCPA 1971).

Because the modified process of Rembold et al. comprises each of the instantly claimed elements, one having ordinary skill in the art would not expect a different and/or an unexpected result to be obtained. Furthermore, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select an appropriate temperature, space velocity, and input ratio of HC:NO_x for the catalyst system evaluation on the basis of suitability for the intended use, since what is recited is merely a testing condition, and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

Regarding claim 26, Keith et al. teaches that the oxidation catalyst platinum group metal is platinum (see Examples 1 and 2).

Regarding claim 27, Keith et al. teaches that in general, the amount of platinum group

Art Unit: 1764

metal added to the system will vary, but in all instances, the amount will be sufficient to provide a small but catalytically effective amount of the platinum group metal in the final catalyst for the purpose for which the catalyst was intended. For instance, in automobile exhaust oxidation and other similar oxidation processes, the oxidation catalyst system contains at least about 1.4 g/L, often up to about 7 g/L, and preferably about 1.8 to 4.8 g/L of the platinum group metal. (see column 3, line 50 to column 4, line 2). Hence, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate amount of platinum group metal to be contained in the oxidation catalyst system (such as the recited amount of about 100 g/ft³) in the modified process of Rembold et al., because it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

Regarding claims 29 and 30, Keith teaches that for auto exhaust purification and other applications using unitary ceramic catalysts, space velocities may range from about 3,000 hr⁻¹ at idle conditions to about 250,000 hr⁻¹ at acceleration or cruising. Preferably, the space velocity is within the range of 30,000 hr⁻¹ to 120,000 hr⁻¹. (column 8, lines 20-32). Accordingly, it would have been obvious for one of ordinary skill in the art at the time the invention was made to pass the exhaust gas over the catalyst systems within the claimed ranges in the modified process of Rembold et al., because the claimed space velocities would have been considered conventional for exhaust gas purification, as evidenced by Keith. Furthermore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate space velocity for each of the lean NO_x catalyst system and the oxidation catalyst system in the modified process of Rembold et al., because the specific space velocities would have been

considered a result effective variable, and one having ordinary skill in the art would have routinely optimized the space velocity for each of the systems on the basis of the desired catalytic reactivity for each system, *In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980).

In addition, where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

5. Claims 9-11, 14, 15, 21-23, 26, 27, 29, 30 and 34-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lane et al. (US 5,522,218) in view of Ishibashi et al. (US 5,330,732) in view of Keith et al. (US 3,331,787).

Regarding claims 9 and 34-36, Lane et al. discloses a lean burn diesel engine 12 in combination with an emission control system 10 (see FIG. 1; column 2, lines 62-67), said emission control system consisting of:

a lean NOx catalyst system (i.e., a deNOx catalyst in converter 13; column 3, lines 2-5);

an oxidation catalyst system (i.e., an oxidation catalyst, not shown, located downstream of the deNOx catalyst; column 3, lines 5-7 and 15-17) ; and

means (i.e., injector 20) for injecting hydrocarbon fuel into the exhaust upstream of the lean NOx catalyst system.

Lane et al., however, is silent as to the lean NOx catalyst system and the oxidation catalyst system each having the instantly claimed components.

Ishibashi et al. teaches a lean NOx catalyst system (column 1, lines 43-51) consisting of a platinum catalyst present at a loading of less than 30 g/ft³ and a support selected from the group consisting of alumina, a zeolite, ceria and zirconia, or a surface area-enlarging washcoat (see Pt catalyst examples in Tables 1 and 4; see also FIGs. 1 and 4; see also column 2, lines 47-68, and

Art Unit: 1764

column 3, lines 11-30). It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the lean NO_x catalyst system of Ishibashi et al. for the lean NO_x catalyst system in the apparatus of Lane et al., on the basis of suitability for the intended use, because the substitution of known equivalent structures (i.e., one known lean NO_x catalyst system for another known lean NO_x catalyst system) merely involves ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958).

In addition, Keith et al. teaches an oxidation catalyst system (see column 1, lines 11-21) consisting of a platinum group metal present at a loading of greater than 30 g/ft³ (see column 3, line 50 to column 4, line 2) and a support selected from the group consisting of alumina, a zeolite, ceria and zirconia (see column 5, line 48 to column 6, line 2). (see also Examples I, II, III). It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the oxidation catalyst system of Keith et al. for the oxidation catalyst system in the apparatus of Lane et al., on the basis of suitability for the intended use, because the oxidation catalyst system taught by Keith et al. is high in activity, has a long life, and is extremely durable under extreme operating conditions (see column 1, lines 22-40). Furthermore, the substitution of known equivalent structures (i.e., one known oxidation catalyst system for another known oxidation catalyst system) merely involves ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958).

Regarding claims 10 and 11, the collective teaching of Lane, Ishibashi and Keith is silent as to whether the lean NO_x catalyst system has an activity sufficient to provide a ratio of % NO_x

Art Unit: 1764

to % HC conversion of at least 0.2, or whether the oxidation catalyst system has an activity sufficient to provide a % HC conversion greater than 80% and a % CO conversion greater than 70%, as measured under the testing conditions of 230 °C, a space velocity of 25,000 hr⁻¹, and an HC:NO_x input ratio of 3:1 counting the HC as equivalent propane. In any event, the modified apparatus of Lane et al. meets the claims, since although the instantly claimed conversion rates for the given testing conditions are not specifically disclosed, a newly discovered property does not necessarily mean the product is unobvious, since this property may be inherent in the prior art. *In re Best* 105 USPQ 430 (CCPA 1977); *In re Swinehart* 169 USPQ 226 (CCPA 1971).

Because the modified apparatus of Lane et al. comprises each of the instantly claimed elements, one having ordinary skill in the art would not expect a different and/or an unexpected result to be obtained. Furthermore, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select an appropriate temperature, space velocity, and input ratio of HC:NO_x for the catalyst system evaluation on the basis of suitability for the intended use, since what is recited is merely a testing condition, and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

Regarding claim 14, Keith et al. teaches that the oxidation catalyst platinum group metal is platinum (see Examples 1 and 2).

Regarding claim 15, Keith et al. teaches that in general, the amount of platinum group metal added to the system will vary, but in all instances, the amount will be sufficient to provide a small but catalytically effective amount of the platinum group metal in the final catalyst for the purpose for which the catalyst was intended. For instance, in automobile exhaust oxidation and

Art Unit: 1764

other similar oxidation processes, the oxidation catalyst system contains at least about 1.4 g/L, often up to about 7 g/L, and preferably about 1.8 to 4.8 g/L of the platinum group metal. (see column 3, line 50 to column 4, line 2). Hence, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate amount of platinum group metal to be contained in the oxidation catalyst system (such as an amount of about 100 g/ft³) in the modified apparatus of Lane et al., because it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

Regarding claims 21 and 37, Lane et al. discloses a process for controlling the emission from a lean burn internal combustion engine (i.e., lean burn diesel engines; column 2, lines 62-67), the process consisting of:

passing exhaust gases from the internal combustion engine 12 over a lean NOx catalyst system

(i.e., a deNOx catalyst contained in converter 13; column 3, lines 2-5);

passing the product gases exiting from the lean NOx catalyst system over an oxidation catalyst

system (i.e., an oxidation catalyst, not shown, located downstream of the deNOx catalyst;

column 3, lines 5-7 and 15-17); and

introducing additional hydrocarbon fuel (HC 25 via injector 20) into the exhaust gas before the

exhaust gas contacts the lean NOx catalyst system.

Lane et al., however, is silent as to the lean NOx catalyst system and the oxidation catalyst system having the instantly claimed components.

Ishibashi et al. teaches a lean NOx catalyst system (column 1, lines 43-51) consisting of a platinum catalyst present at a loading of less than 30 g/ft³ and a support selected from the group

Art Unit: 1764

consisting of alumina, a zeolite, ceria and zirconia, or a surface area-enlarging washcoat (see Pt catalyst examples in Tables 1 and 4; see also FIGs. 1 and 4; see also column 2, lines 47-68, and column 3, lines 11-30). It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the lean NO_x catalyst system of Ishibashi et al. for the lean NO_x catalyst system in the process of Lane et al., on the basis of suitability for the intended use, because the substitution of known equivalent structures (i.e., one known lean NO_x catalyst system for another known lean NO_x catalyst system) merely involves ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958).

In addition, Keith et al. teaches an oxidation catalyst system (see column 1, lines 11-21) consisting of a platinum group metal present at a loading of greater than 30 g/ft³ (see column 3, line 50 to column 4, line 2) and a support selected from the group consisting of alumina, a zeolite, ceria and zirconia (see column 5, line 48 to column 6, line 2). (see also Examples I, II, III). It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the oxidation catalyst system of Keith et al. for the oxidation catalyst system in the process of Lane et al., on the basis of suitability for the intended use, because the oxidation catalyst system taught by Keith et al. is high in activity, has a long life, and is extremely durable under extreme operating conditions (see column 1, lines 22-40). Furthermore, the substitution of known equivalent structures (i.e., one known oxidation catalyst system for another known oxidation catalyst system) merely involves ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958).

Regarding claims 22 and 23, the collective teaching of Lane, Ishibashi and Keith is silent as to whether the lean NO_x catalyst system has an activity sufficient to provide a ratio of % NO_x to % HC conversion of at least 0.2, or whether the oxidation catalyst system has an activity sufficient to provide a % HC conversion greater than 80% and a % CO conversion greater than 70%, as measured under the testing conditions of 230 °C, a space velocity of 25,000 hr⁻¹, and an HC:NO_x input ratio of 3:1 counting the HC as equivalent propane. In any event, the modified process of Lane et al. meets the claims, since although the instantly claimed conversion rates for the given testing conditions are not specifically disclosed, a newly discovered property does not necessarily mean the product is unobvious, since this property may be inherent in the prior art. *In re Best 105 USPQ 430 (CCPA 1977); In re Swinehart 169 USPQ 226 (CCPA 1971)*. Because the modified process of Lane et al. comprises each of the instantly claimed elements, one having ordinary skill in the art would not expect a different and/or an unexpected result to be obtained. Furthermore, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select an appropriate temperature, space velocity, and input ratio of HC:NO_x for the catalyst system evaluation on the basis of suitability for the intended use, since what is recited is merely a testing condition, and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller, 105 USPQ 233*.

Regarding claim 26, Keith et al. teaches that the oxidation catalyst platinum group metal is platinum (see Examples 1 and 2).

Regarding claim 27, Keith et al. teaches that in general, the amount of platinum group metal added to the system will vary, but in all instances, the amount will be sufficient to provide

Art Unit: 1764

a small but catalytically effective amount of the platinum group metal in the final catalyst for the purpose for which the catalyst was intended. For instance, in automobile exhaust oxidation and other similar oxidation processes, the oxidation catalyst system contains at least about 1.4 g/L, often up to about 7 g/L, and preferably about 1.8 to 4.8 g/L of the platinum group metal. (see column 3, line 50 to column 4, line 2). Hence, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate amount of platinum group metal to be contained in the oxidation catalyst system (such as an amount of about 100 g/ft³) in the modified process of Lane et al., because it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233. Furthermore, numerical ranges that overlap prior art ranges were held to have been obvious. *In re Wertheim* 191 USPQ 90 (CCPA 1976); *In re Malagari* 182 USPQ 549 (CCPA 1974); *In re Fields* 134 USPQ 242 (CCPA 1962); *In re Nehrenberg* 126 USPQ 383 (CCPA 1960).

Regarding claims 29 and 30, Keith teaches that for auto exhaust purification and other applications using unitary ceramic catalysts, space velocities may range from about 3,000 hr⁻¹ at idle conditions to about 250,000 hr⁻¹ at acceleration or cruising. Preferably, the space velocity is within the range of 30,000 hr⁻¹ to 120,000 hr⁻¹. (column 8, lines 20-32). Accordingly, it would have been obvious for one of ordinary skill in the art at the time the invention was made to pass the exhaust gas over the catalyst systems within the claimed ranges in the modified process of Lane et al., because the claimed space velocities would have been considered conventional for exhaust gas purification, as evidenced by Keith. Furthermore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate space

Art Unit: 1764

velocity for each of the lean NOx catalyst system and the oxidation catalyst system in the modified process of Lane et al., because the specific space velocities would have been considered a result effective variable, and one having ordinary skill in the art would have routinely optimized the space velocity for each of the systems on the basis of the desired catalytic reactivity for each system, *In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980). In addition, where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

Response to Arguments

6. Applicant's arguments with respect to claims 9-11, 14, 15, 21-23, 26, 27, 29, 30 and 34-37 have been considered but are moot in view of the new grounds of rejection, necessitated by amendment.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is (571) 272-1449. The examiner can normally be reached on 9:30 am - 5:30 pm Monday through Friday.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Art Unit: 1764

system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jennifer A. Leung

September 15, 2006 



Glenn Caldarola
Supervisory Patent Examiner
Technology Center 1700